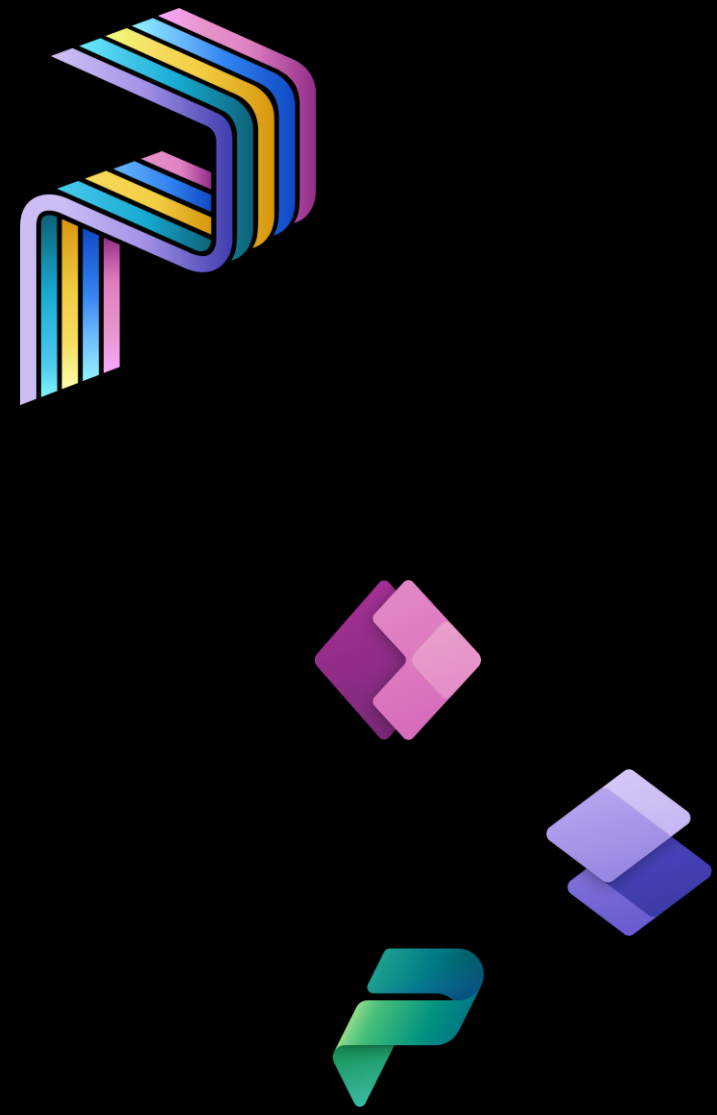
UNLOCK THE HIDDEN POTENTIAL OF VIRTUAL TABLES

Nathalie Leenders



WHO AM I?

Nathalie Leenders

- Power Platform Consultant at Wortell
- Microsoft MVP Business Applications
- MCT
- Has a purrrsonal assistant called Floof
- Loves to travel and share knowledge
- Loves to post the 🦡

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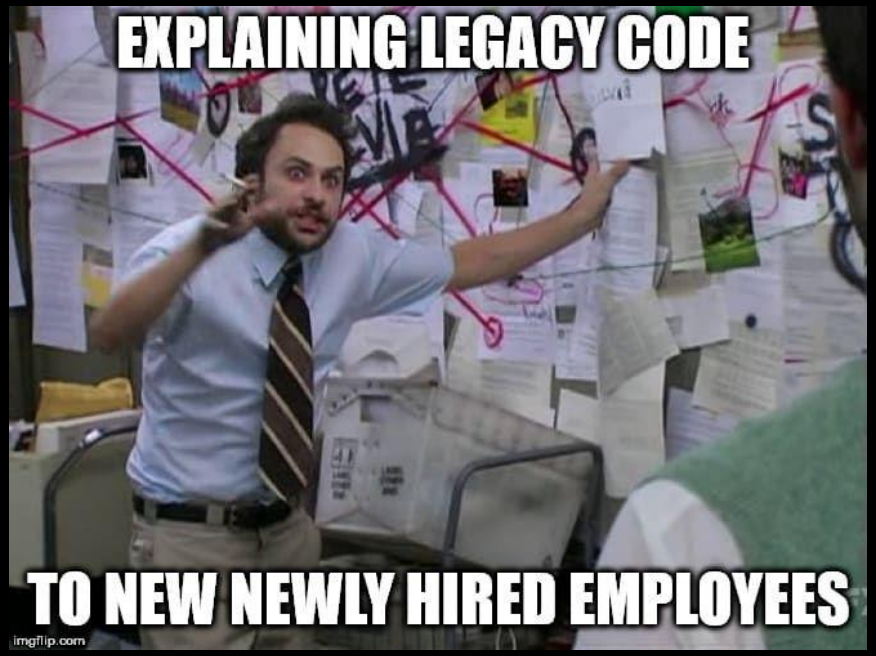
GOPAS

AGENDA

Storytime
Functionality
What are Virtual Tables?
Different Native Data sources
Leveraging the Power Platform
Reporting
Known Limitations
Recap

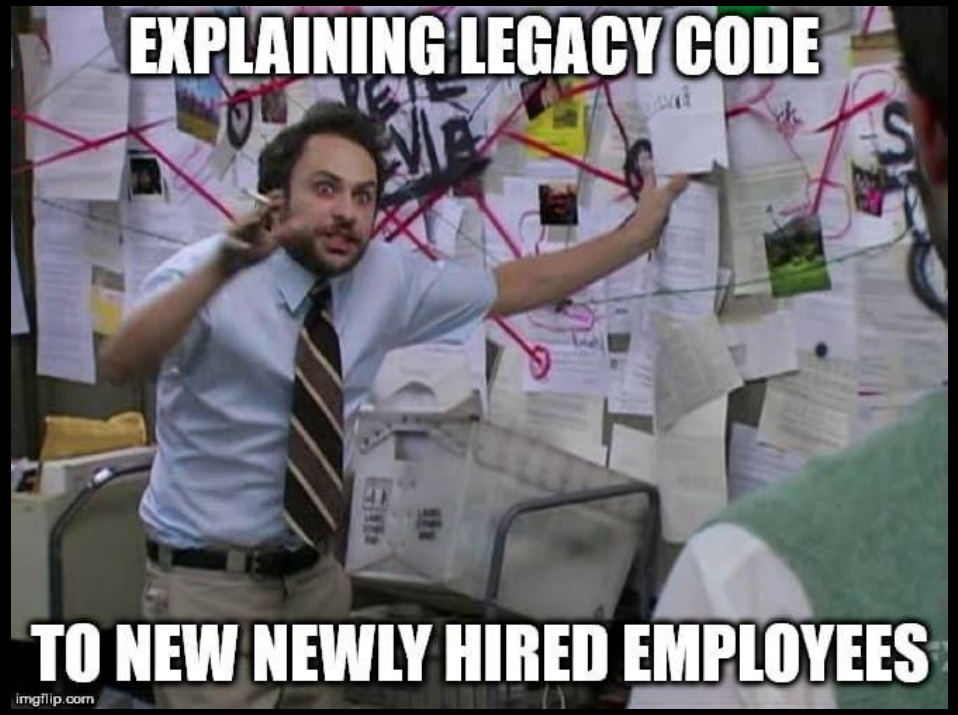
STORYTIME

REPLACING A LEGACY APP – THE DATA



The application we wanted to replace, had a DBF data backend
250+ tables, no known schema or relationships, no documentation

REPLACING A LEGACY APP – THE EXPORT



Only software to read the data I could get, was the DBF View with export to csv option
Manually exported, hand picked over 50 tables to CSV (it was either that or learn Python)

REPLACING A LEGACY APP – THE SOLUTION

SQL Database
Pipeline loaded in all the data into tables

+

Dataverse
Connected to SQL using Virtual Tables

=

PowerApps
Connected with Virtual Tables

REPLACING A LEGACY APP – THE RESULT?

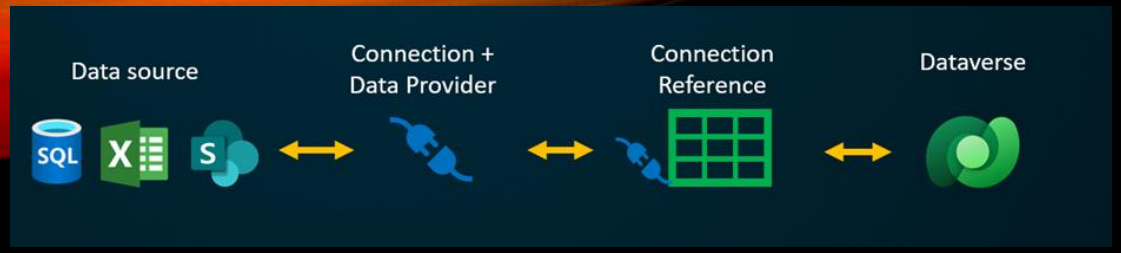
A model driven app, connected to Dataverse, using the data from SQL.

REPLACING A LEGACY APP – THE RESULT?

Sounds good right?

WHAT ARE VIRTUAL TABLES?

AND WHY SHOULD I USE THEM?



WHAT ARE THEY?

- Your Virtual Table reads your data from your data source and is able to display it in Dataverse.
- Virtual connectors and tables in Dataverse
- **Re-use data**, without needing to migrate
  - Use them through Dataverse in your app, Power Pages or others.
- Through this connection you can automate without excessive costs for migrations.
- **Full CRUD** (Create, Read, Update, Delete) to your data source.

Table	Name	Type	Managed	Customizable	Tags
Entity Catalog for SQL	msdyn_ec[redacted]	Virtual	No	Yes	Custom
Werk[redacted]	cr3ae_werk[redacted]	Virtual	No	Yes	Custom
Custom Entity [dbo].[Werk[redacted]	cr3ae_dbo_werk[redacted]	Virtual	No	Yes	Custom

CONSIDERATIONS

Model driven apps and **Power Pages** can only use Dataverse as a data source.

Can we add new components to the apps that are compatible?

Auditing can only take place on the source, **not** on the Virtual Table itself, does this fit the requirements?

Does the client have budget and desire to move the data?

You can **reuse** data.

Prevent high costs.

Premium license needed.

Does the solution fit within the constraints of Virtual Tables?

Is your source SQL and do you want dropdown menus?

TIMELINE

1996	1997	1998	2004	Pre-2021	Oct '21 May '22	Mid-2022	Jan 2023	2023 - March	2024
ZappySys Driver First Virtual Tables?	Microsoft Jet 3.5	4d web component	NAVision – Virtual tables – links to tables on SQL	**No Virtual Data connector Provider** – Requires Code	**Virtual Connector Provider** – register with Azure – No code required	Full CRUD Supports relationships	**Virtual Connector Provider- NEW wizard** No Code Customize names Quick setup	Dataverse for Teams support Polymorphic relationships added	

FUNCTIONALITY

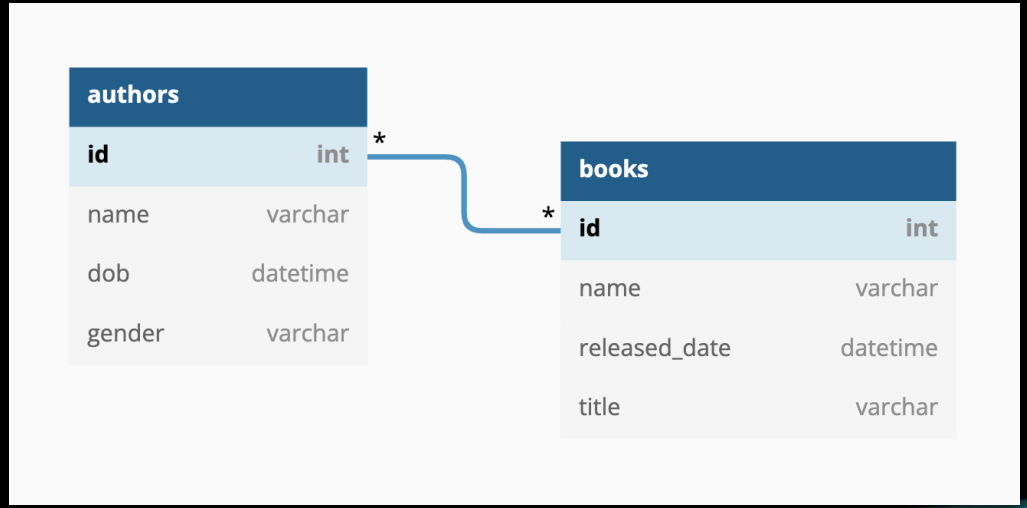
VIRTUAL TABLE PROVIDERS

	Virtual Connector Providers	OData Data Providers	Custom Data Providers
Code required	No Code	Pro	Pro
Data sources supported	Excel, SharePoint, SQL (new: Fabric, Snowflake, Salesforce, Oracle)	OData web services; such as D365 or Azure	Custom plugins to call APIs
Easy to setup/ Supportability	Easy	Medium	Difficult

WHAT CAN IT DO?

- Connect to your data source that's not natively on Dataverse
- Full CRUD operations for custom virtual tables (if the source let's you)
- Multi-Table (Polymorphic) lookups supporting virtual tables
  - Meaning, you can create lookup tables from and to your virtual table.

RELATIONSHIPS IN VIRTUAL TABLES



RELATIONSHIPS

Virtual tables are enabled for relationships.
You can set up 1:N, N:1, and custom multi-table (polymorphic) relationships.

Relationships can be established between:

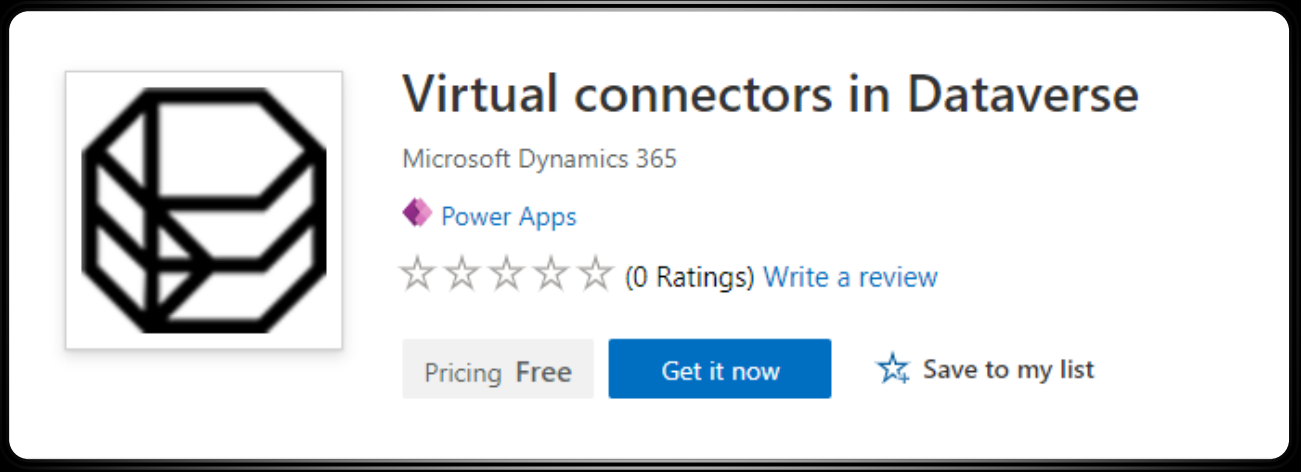
- Local tables in Dataverse and virtual tables.
- Virtual tables and other virtual tables from the same provider, for example SQL->SQL.

For instance, you can't set up a relationship between a virtual table created using the OData virtual table provider and a virtual table created using the virtual connector provider.

More on Virtual Table relationships here

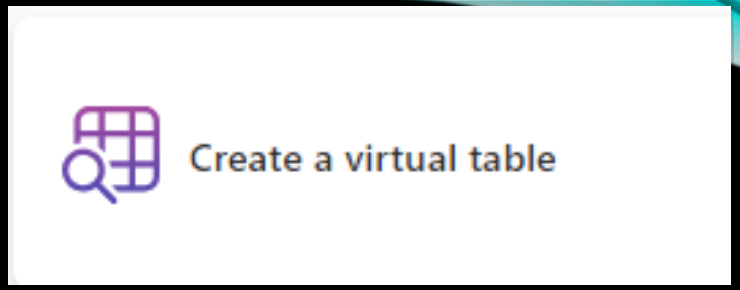
INSTALLING VIRTUAL CONNECTORS IN DATAVERSE

- Make sure you have Premium
  - (without it, you won't be able to use Dataverse or virtual tables)
- Go to AppSource
- Search for Virtual Connectors in Dataverse
- Install in your desired environment
- You're now ready to use virtual tables.



CREATE A VIRTUAL TABLE

CREATE A VIRTUAL TABLE



New table from external data

Close

Connection
Data
Review and finish

New connection Refresh

Want another data source? Currently we support SharePoint and SQL Server. However, there is a workaround for other data sources. Details here.

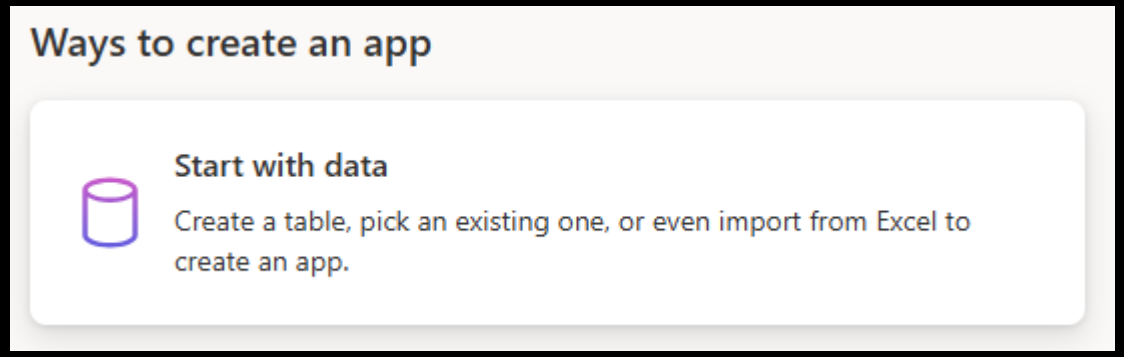
Select a connection

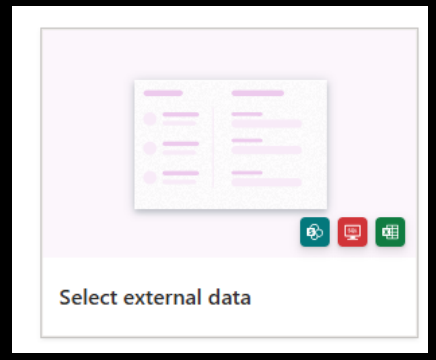
Choose a connection to create a new table from external data.

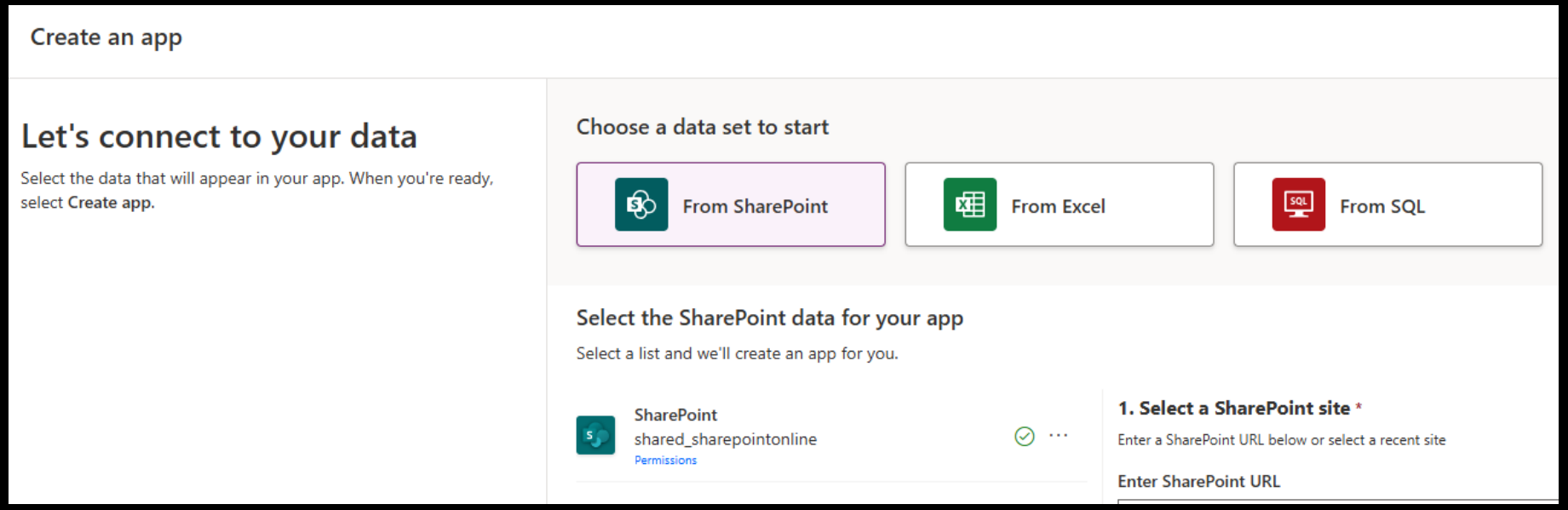
SharePoint	TenantAdmin@t78hc.onmicrosoft.c...
SharePoint	TenantAdmin@t78hc.onmicrosoft.c...
SQL Server	Add Connection
Snowflake	Add Connection
Microsoft Fabric	Add Connection
Salesforce	Add Connection
Oracle Database	Add Connection

Advanced options

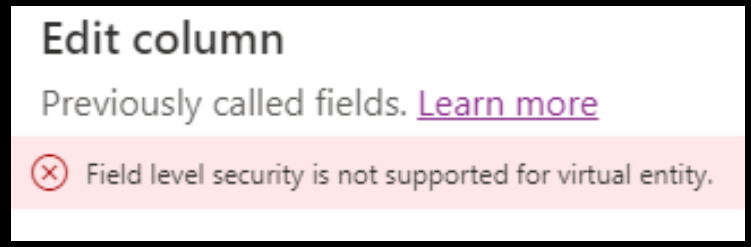
CREATE A VIRTUAL TABLE THROUGH CREATING AN APP







GOVERNANCE AND COLUMN LEVEL SECURITY



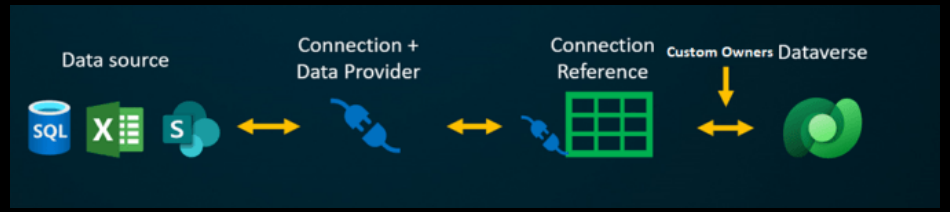
Virtual tables are organizational level tables.
It will display whatever your account authorized to it has access to.

☑ Security at the source, and through security roles on Dataverse.

☒ No Field Level, or Column level security is possible/supported currently.

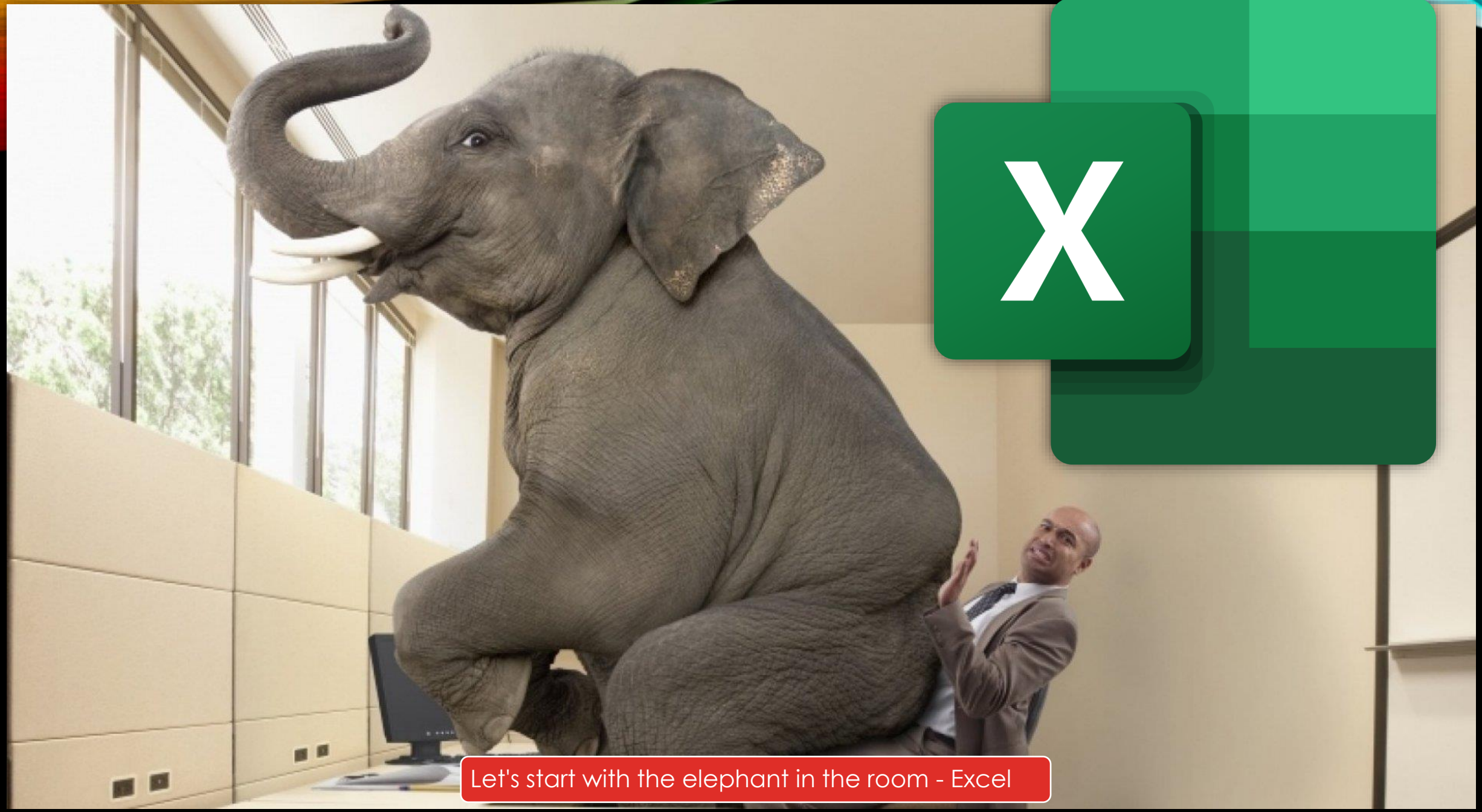
☑ **Custom lookup fields with polymorphic lookups**

It is possible to create custom security through polymorphic lookups and plugins.
Check out this article by Dynamics Ninja that explains how:
Virtual Tables - Custom Ownership - Dynamics Ninja



Quick tip for the Security role in Dataverse;
Make sure to add rights to the Connection table.

DIFFERENT NATIVE DATA SOURCES


Let's start with the elephant in the room - Excel

WHY IS IT SUCH A BAD I

- Data **needs** to be in tables
- Macros **not** supported
- Formulas **not** supported
- Excel is currently **not** supported in the table driven Virtual Table experience
- Excel files **must be stored on a OneDrive** to participate in a Virtual Table connection
- **The workbook cannot be in use** when using it for Power Apps or Power Automate

Specific Excel Connector Limitations: Excel Online (Business) connector reference.

DIFFERENT NATIVE DATA SOURCES

LIMITATIONS

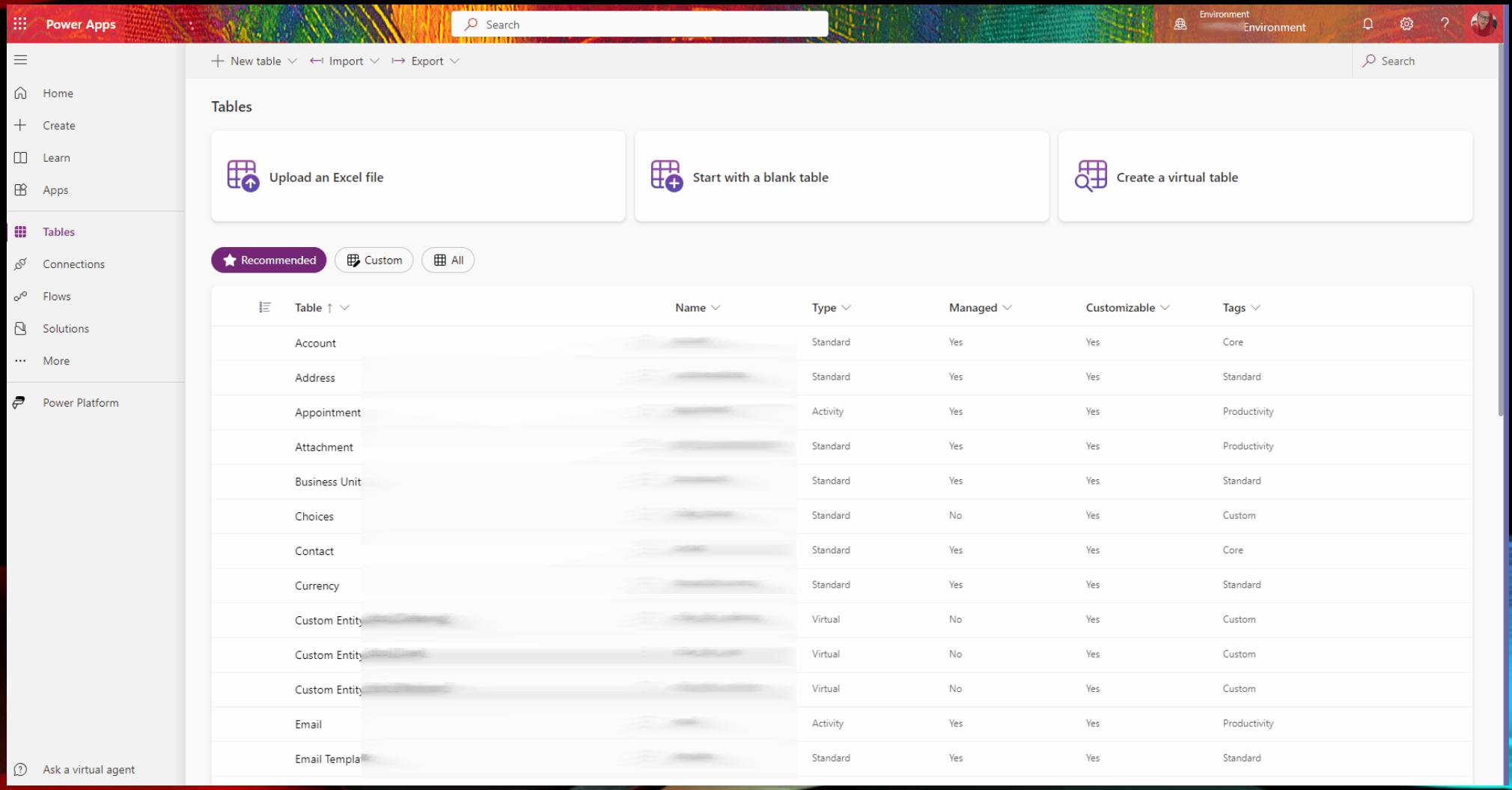
- You currently can't select an All view for SharePoint columns on a virtual table. This is a known issue. (It is known)
- The following column types can't be included in a virtual table at this time:
  - Person
  - Image
  - Managed metadata
  - Location: coordinates
  - Attachment
- SharePoint specific columns that will be shown in the virtual table:
  - Compliance Asset ID is an internal column from SharePoint for tracking purposes. It can be ignored.
  - ID is the external primary key from SharePoint. It's read-only and can be ignored.

- Choice fields supported for SharePoint!
- Attachments can be uploaded to the virtual table connection

DIFFERENT NATIVE DATA SOURCES

CONNECTING TO SQL

Pro tip!
toggle/checkbox/Boolean
Convert your SQL column to BIT
BIT is an integer with 0 and 1



Dataverse Choices to SQL backend- Update! - Power Platform Tips & Tricks (nathalieleenders.com)

VIRTUAL STORED PROCEDURE

Through the Dataverse Accelerator App

- Dataverse uses the plugin capability to call stored procedures.

- You can specify how you want to fill it through the wizard
- Input what is needed, in the plugin it will allow you to say
  - field a is input 1
  - field b is input 2
- Make it execute on a button as an onclick event
- Run and push it the output only to a SQL table
- Access a Virtual Table to access the SQL Table

- **No delegation issues**

  That is an issue through when you try through Power Automate.
  Also, it's much faster and much more responsive.

- Output stays in SQL right now but this could be valuable to your client process.

DIFFERENT NATIVE DATA SOURCES

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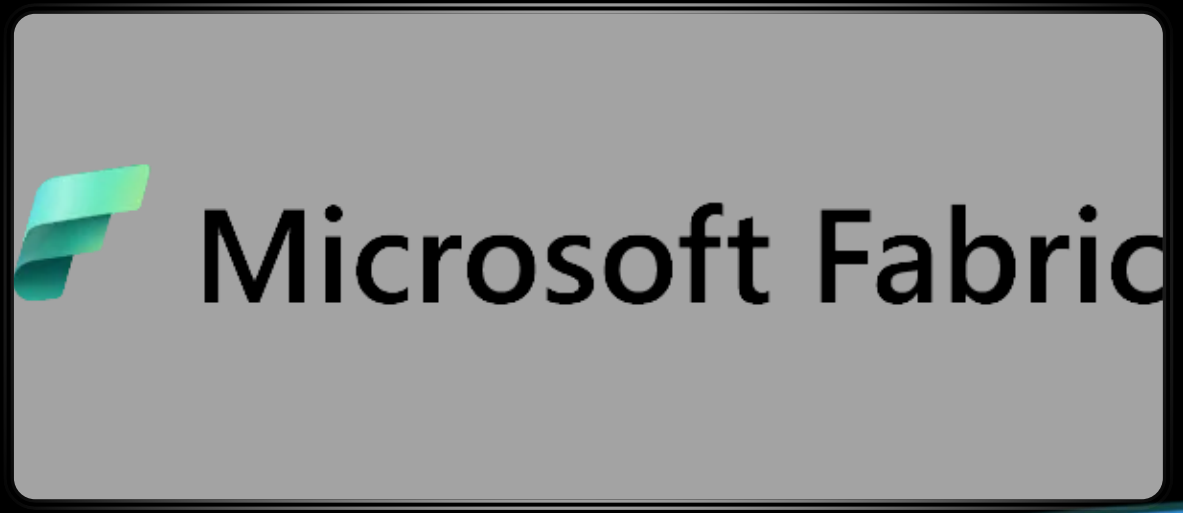


CONNECTING TO FABRIC (PREVIEW)

- Preview features aren’t meant for production use and may have restricted functionality.

- While the table you selected from Fabric Lakehouse might not have a primary key defined,
you need to select a field that is unique to continue.

- If you don't select a unique field, the table might not show all the records.
While the wizard selects a field based on metadata available, the selection might not be accurate.

DIFFERENT DATA SOURCES

AZURE DATA LAKE TO SERVERLESS SQL

CONNECTING TO AZURE SYNAPSE AND SQL

1. Get a data lake
2. Create a Serverless SQL Pool
3. Connect to External Tables, to the Parquet files
4. Connect to Virtual Tables

VIRTUAL TABLES WITH AAD TABLE?

AAD User (Azure Active Directory/Entra ID) is different from the **User table** in Dataverse.

- No manager lookups, possible future feature
- No groups, only users can be looked up

Dataverse User table Only displays users with a Dataverse license.
AAD User table Will show anyone in the AAD User address book.



- Virtual table that connects to ALL users as **read-only**.
- This table is NOT available through Power Automate. (It leverages Graph)
- Include the AAD User table in multi-table lookups (polymorphic lookups)

aaduser table/entity reference (Microsoft Dataverse) - Power Apps | Microsoft Learn

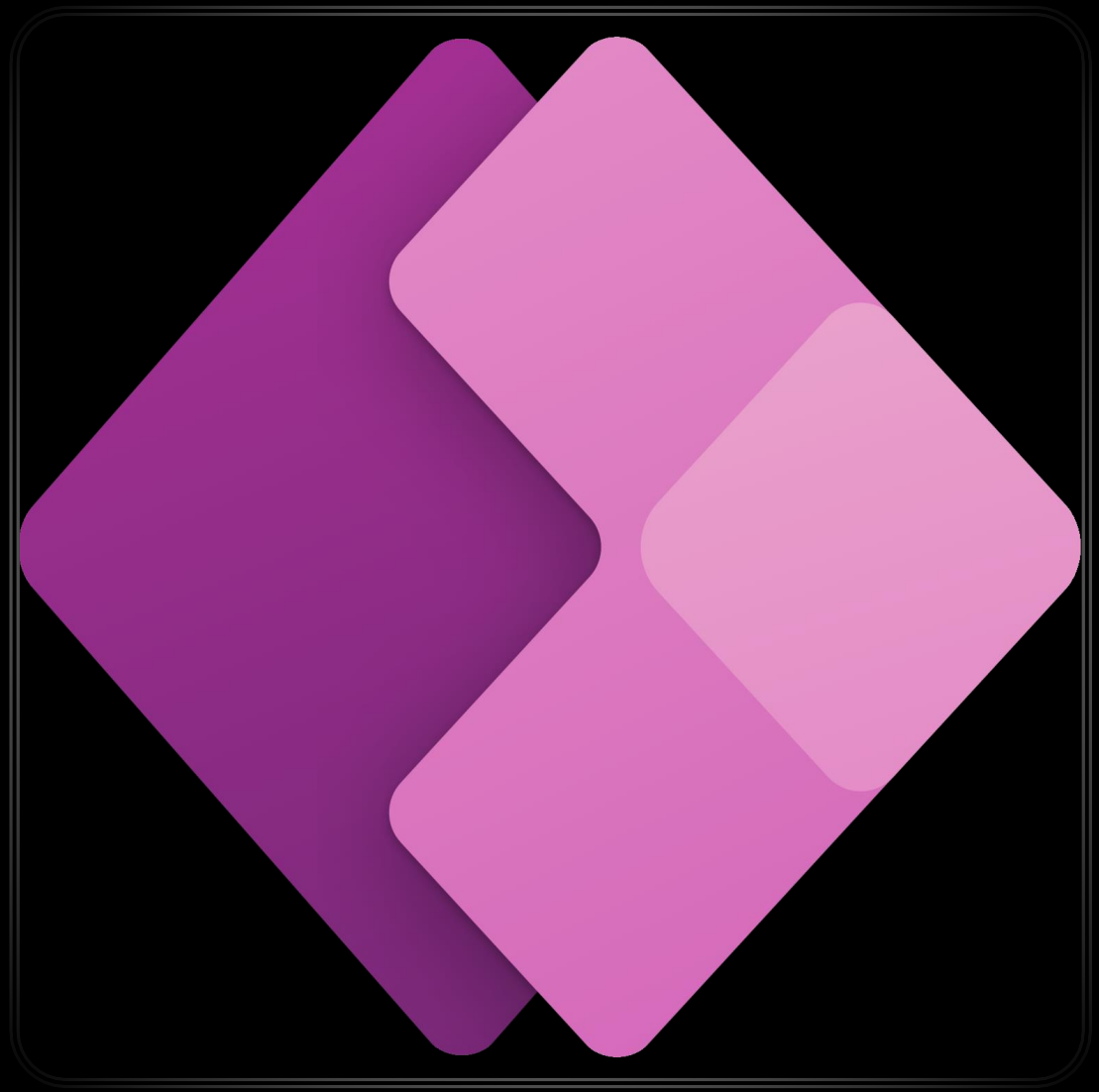
LEVERAGING THE POWER PLATFORM

MODEL DRIVEN APPS

- ‘Only’ works with Dataverse
- Any other data source needs to be connected through a virtual table.

CANVAS APPS

- ☑ • Works with all data connectors!
- ☒ • Save data locally in the table.
- ☒ • Patch to the virtual table with custom fields.
- ☑ • Display data through lookup fields



POWER AUTOMATE

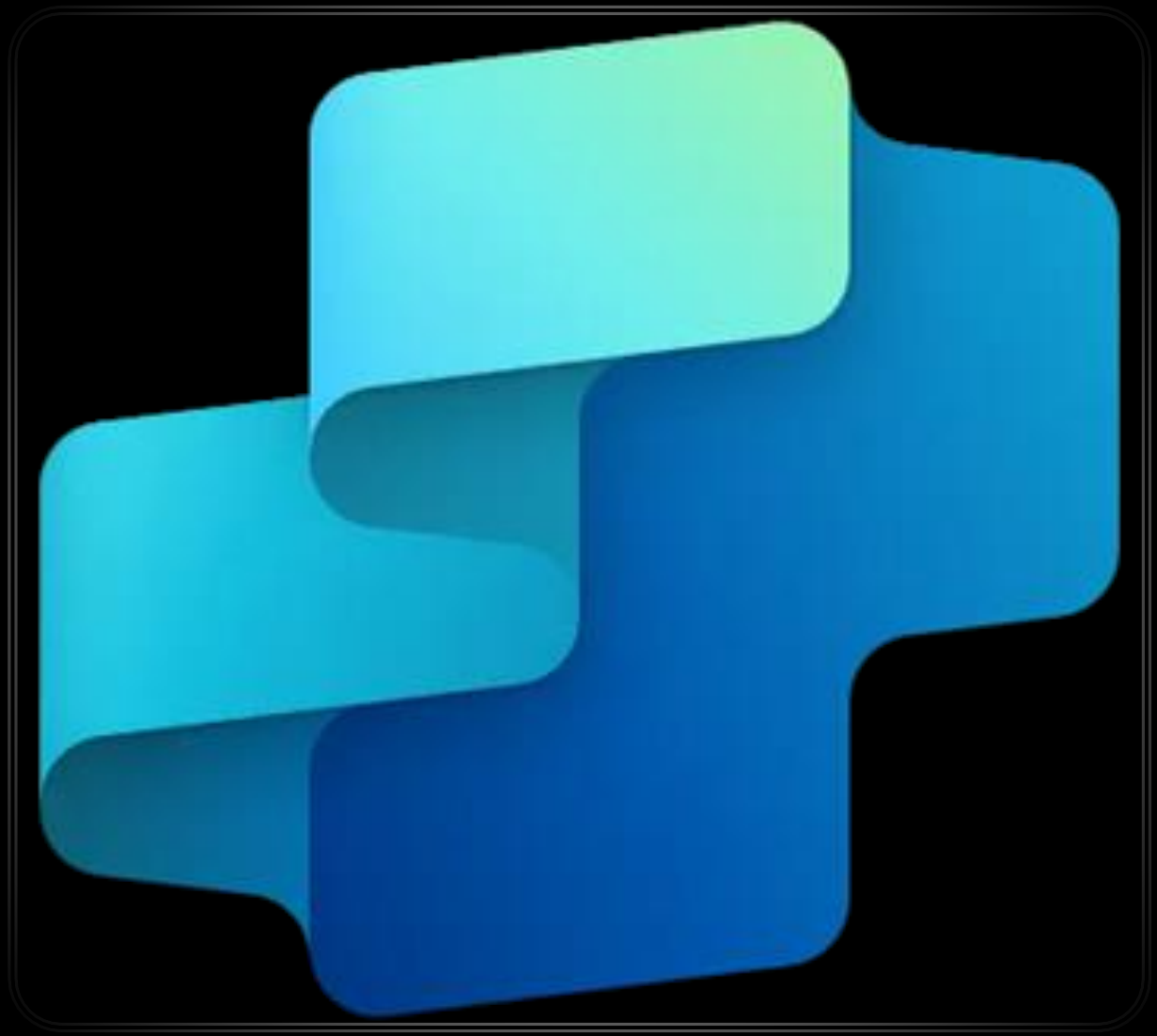
- Dataverse trigger - ‘ When a row is added, modified or deleted’ doesn’t work with Virtual Tables.

- Use a trigger on your data source!
- For example, when a SQL item has been modified.

- Dataverse trigger - ‘ When a row is added, modified or deleted’ is supported for Virtual Tables with Dataverse Events (More on that later)

COPILOT STUDIO

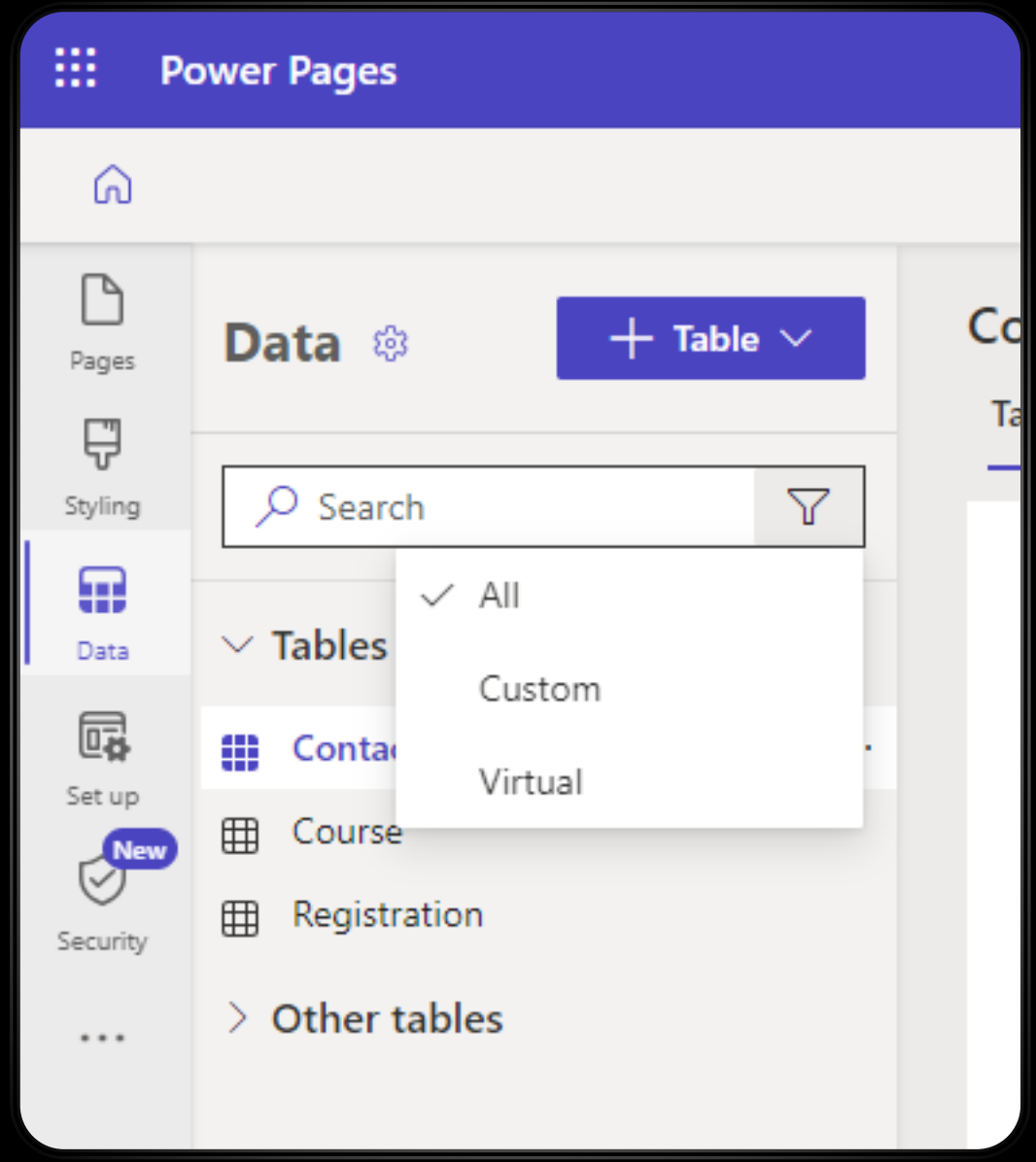
- •You can call information from Dataverse, both normal and virtual tables.
- •Connect using Power Automate in an action to create new rows, update rows, list rows etc. for a Virtual Table.



POWER PAGES

- **Create** a Virtual Table straight from Power Pages with SQL and Sharepoint (lists)! - connect to an external table data option.
- **Filter** on virtual or regular on the add table interface
- The **icon** has also changed to differentiate between the types of tables, Virtual vs Dataverse

POWER PAGES


Power Pages
Pages
Styling
Data
Set up
New
Security
Data
Table
Search
All
Custom
Virtual
Tables
Course
Registration
Other tables

REPORTING

VIRTUAL TABLE - REPORTING

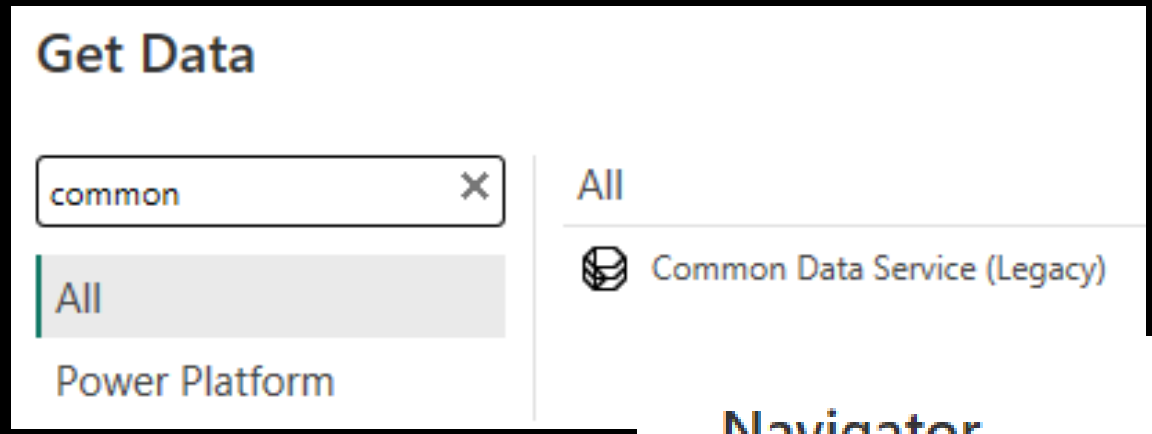
Only available in PowerBI through the Common Data Service (Legacy) connector

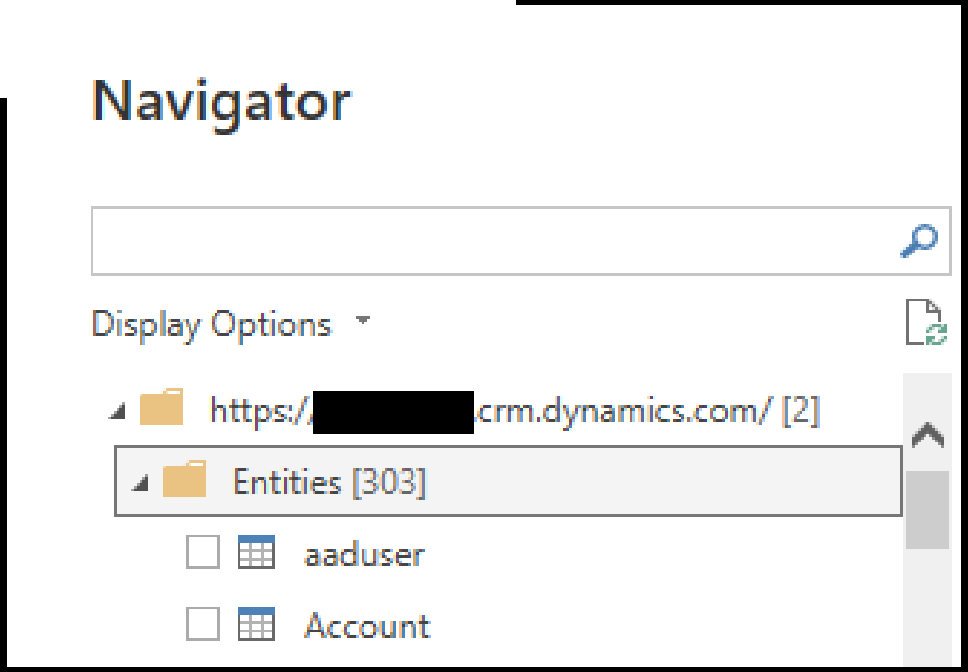
Don't use the Dataverse connector.
It wont display the virtual tables.

You can also connect directly to the source as well.

Power Query Common Data Service (Legacy) connector

VIRTUAL TABLE - REPORTING





ALM FOR VIRTUAL TABLES

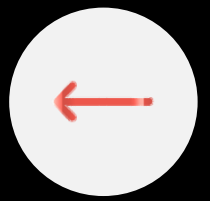
MAKE USE OF **ENVIRONMENT VARIABLES** UPON CREATION

PROVIDE BETTER **PIPELINE DISTRIBUTION**

NO MORE MANUAL WORK AFTERWARDS!

SQL AND **SHAREPOINT** VIRTUAL TABLES CAN USE **ENVIRONMENT VARIABLES**

EXPORT
IN THE SOLUTION MAKER YOU CAN SELECT/CREATE A TARGET SOURCE

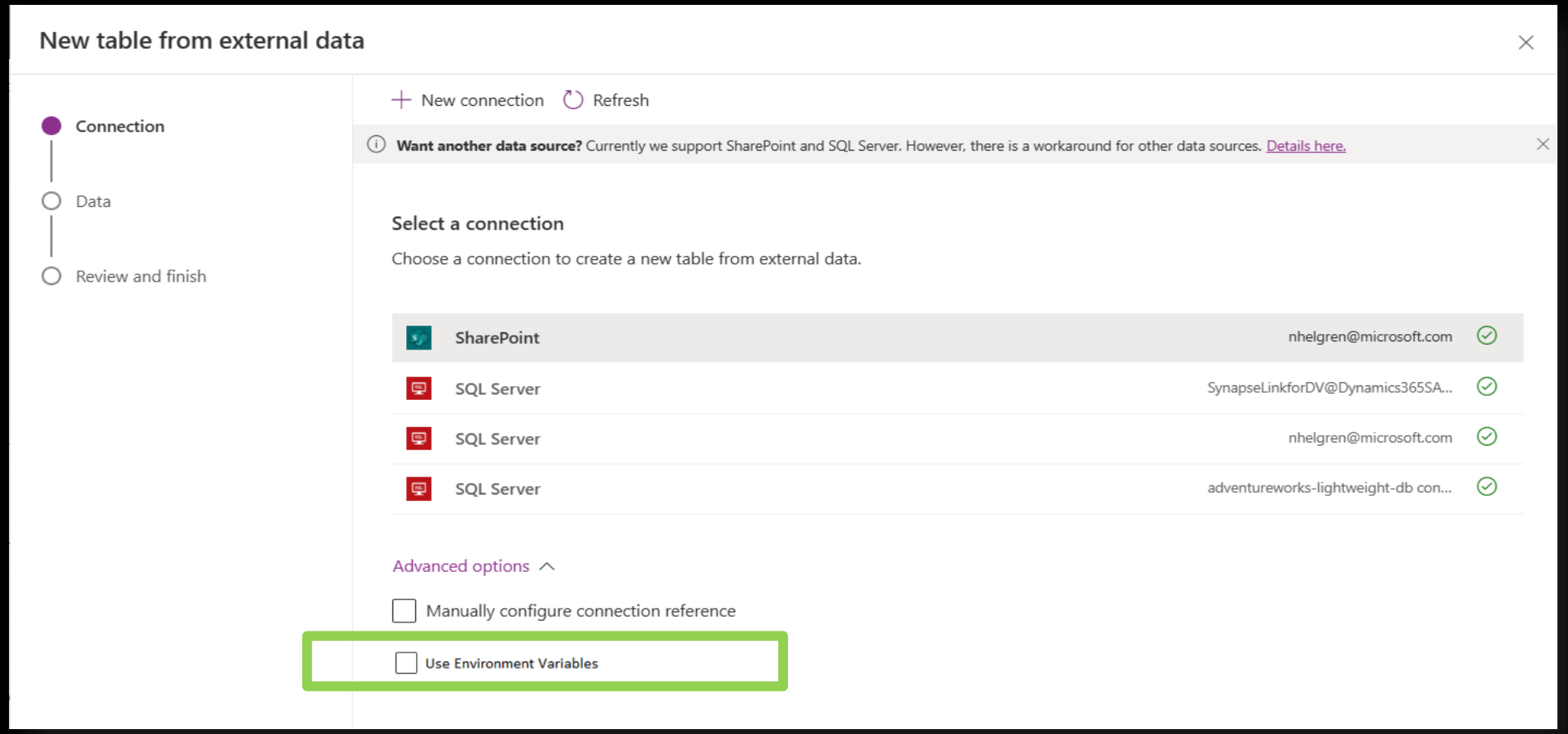


IMPORT
USERS CAN SELECT/PROVIDE THE TARGET SOURCE

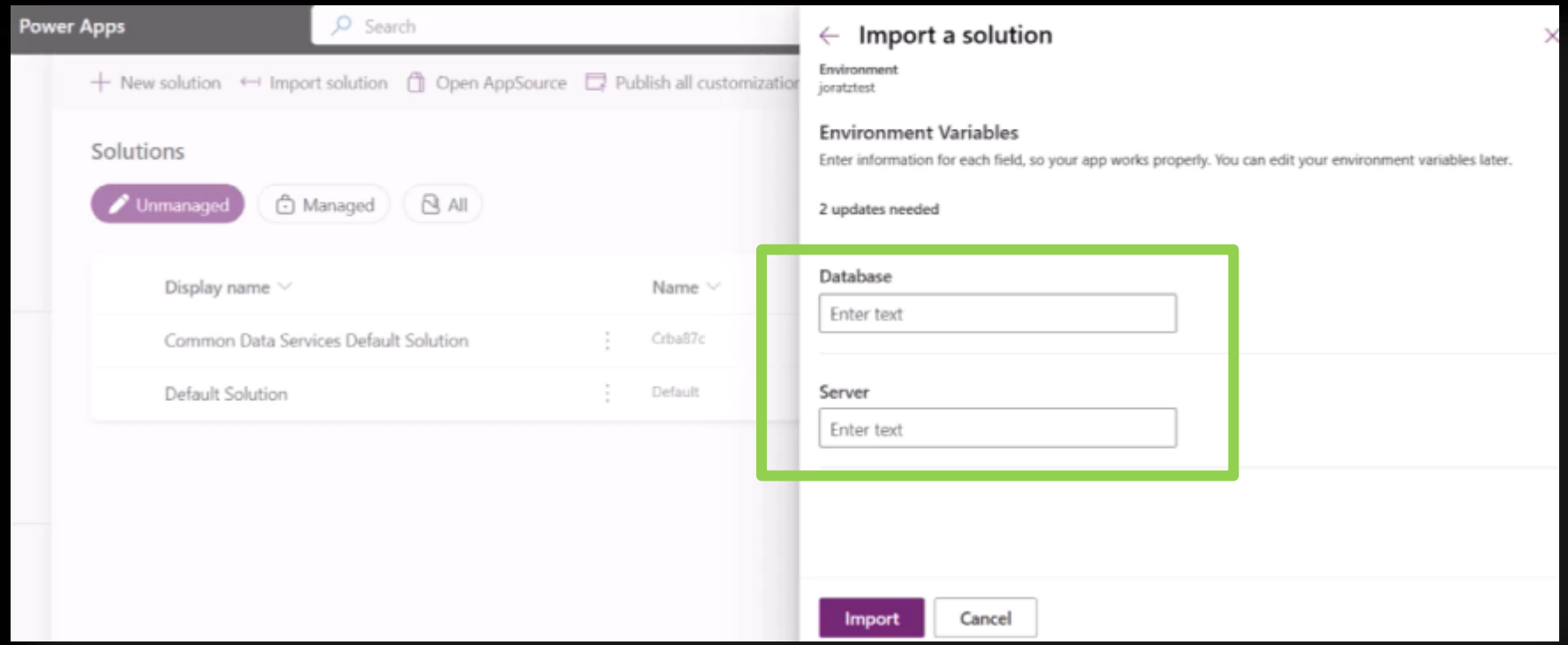
TO BE ADDED **DIRECTLY IN THE ALM PIPELINE**.

ALM FOR VIRTUAL TABLES

- Announced in 2023 but not yet live



ALM for Virtual Tables




KNOWN LIMITATIONS
ON ALL VIRTUAL TABLES
+ POSSIBLE WORKAROUNDS

POSITIVE POINTS

- View data from multiple tables as a single table
- Perform complex queries
- View of data that is customized for a specific user or group
- Access data from external sources
- No need to migrate data
- Cost saving – no double data storage needed like with Dataflows
- Easy setup, no custom coding needed
- You're able to leverage them throughout the entire Power Platform
- Supported by Dataverse for Teams

LIMITATIONS

1. No dropdown/choice columns on SQL data backend
2. No Field Level Security possible (Security at the source)
3. Business Process Flows are not supported
4. Files and attachments are not supported
5. Virtual table queries are limited to return 1000 records per query
6. Max character length for text is 4000 characters
7. No activity type tables (feedback)

LIMITATIONS

- Rollup and calculation fields not supported
- Audit logs - No Dataverse auditing possible on a virtual table
- Values inside Primary Column need to be GUID (non string)
- The primary key needs to be correct or the data (SQL or Excel) wont display
- Cannot set view on primary key column – descending
- Dataverse can only create columns that include datatypes that are compatible
- Existing tables cannot be converted
- Virtual tables don’t allow joined connections
- SharePoint will use the hidden numeric ID field present in all lists

PCF Gallery

PCF COMPONENTS

Trick your virtual entity connection into allowing dropdowns, or other unsupported ISV/data actions.

- **For example:** A dropdown/choice doesn't exist into SQL.
  Make it look like one, but have the data be outputted as text.

What is a PCF component?

- It's a piece of code, wrapped around your control, to make it behave differently, but still have the same result
- You can re-use these components throughout your solutic

After importing your component

- Double click on your control in your form
- Add to your form control (if desired, hide the default con

CSV Dropdown Control | PCF Gallery

Pro tip – Make sure you also import your PCF component in your destination environment if you do ALM

RECAP + FINAL NOTES

- Works best in cases to read information
- Natively Excel, SharePoint, SQL and added Salesforce, Snowflake, Oracle and Fabric
- You can use them throughout the Power Platform
- New Dataverse filtering with icons for regular and virtual tables
- ALM variables not yet added
- Reporting possible with Virtual Tables
- Any other data connectors require OData queries or other deeper technical connections
- Not every column is compatible depending on your data source
- They can break easily, no way to update virtual tables.
  You need to recreate the connection
- No auditing on the virtual tables
- Full CRUD ‘mostly’ works
- You can only query per 1000 items. Multi stacking is possible, but not recommended

THAT'S IT- QUESTIONS?

THANK YOU

NATHALIE LEENDERS